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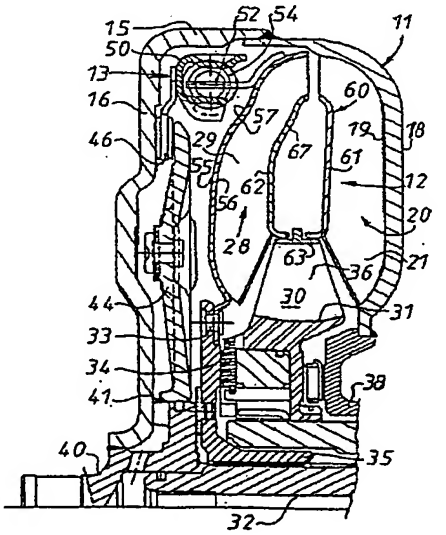
(54)【発明の名称】　変形タービン付き流体動力連結装置

(57)【要約】
本発明は、軸の回りで回転的に対称的である、入力軸の回転に連動できる横断方向の壁（１６）を備えたケーシング、および流体動力伝動で、ブレード付きタービンホイール（２８）を駆動できるブレードホイール、またはインペラー（２０）を含むハウジングを備える流体動力装置に関し、インペラー（２０）およびタービンホイール（２８）が、シェル（１８）－（５５）の内面（１９）－（５６）と一体化したブレード（２１）－（２９）付きのシェル（１８）－（２５）から成り、中心コアは、流体を案内するように設計され、タービン（２８）のシェル（５５）は、中空の沈下部（５７）によって変形され、該コア（６０）は、直径に関係なく、通過断面定数を維持する後者（沈下）に沿って伸びる、沈下部（５７）と一致する突起部（６７）を有する。



【特許請求の範囲】

【請求項１】　軸の回りに回転対称であり、一方では、駆動軸に回転連動するのに適した横断方向壁（１６）を備えるケーシング（１５）－（１８）と、他方では、被駆動軸（３２）に回転連動するのに適したハブ（３５）と一体化した、タービンブレード円板（２８）を流体動力的に駆動するのに適する、ブレード円板またはインペラー（２０）とを備えるハウジング（１１）を含み、該インペラー（２０）およびタービン円板（２８）が、シェル（１８）－（５５）の内面（１９）－（５６）と一体化したブレード（２１）－（２９）を有するシェル（18）－（５５）を有し、そこでは中央のコアが、流体を案内するために設けられ、タービン（２８）のシェル（５５）が、中空の沈下部（５７）により変形され、該コア（６０）が、それに沿って伸びる沈下部（５７）の形状と一致する形状の突起部（６７）を有することを特徴とする流体動力連結装置。

【請求項２】　突起部（６７）は、流体の通路断面が、それが測定される半径に関係なく、実質的に一定であるように沈下部（５７）に沿って伸びていることを特徴とする、請求項１に記載の流体動力連結装置。

【請求項３】　回路の内部輪郭が、軸の部分において、インペラー（２０）のシェル（１８）の外壁が全体として軸に直交するようになっていることを特徴とする、請求項１または２に記載の流体動力連結装置。

【請求項４】　インペラー（２０）およびタービン（２８）が、トルクコンバータ（１２）を構成するために、リアクター（３０）と関連づけられていることを特徴とする、請求項１または３に記載の流体動力連結装置。

【請求項５】　ロッククラッチ（１３）が、ケーシング（１５）－（１８）の内側に置かれ、タービン（２８）とケーシング（１５）－（１８）の間で作用し、前記クラッチが、トーションダンパー、軸に沿って移動自在であるように取り付けられるピストン（４４）、および前記ピストン（４４）と横断方向壁（１６）の内面の間でクランプされるのに適する少なくとも１つの摩擦ライニングを備えていることを特徴とする、請求項１～４のいずれかに記載の流体動力連結装置。

【請求項６】　トーションダンパーが、２個の部品の間に挟まれた円周方向に

作用を有するばね（５４）、案内ワッシャー（５０）、およびウェブ（５２）を備え、これらの部品の一つが、摩擦ライニングと回転中一体化し、他が、タービン（２８）と一体化されていることを特徴とする、請求項５に記載の流体動力連結装置。

【発明の詳細な説明】

【０００１】

本発明は、ハウジングに収容されているタービンブレード円板を流体動力的に駆動するのに適するブレード円板を内部に有する、回転するハウジングを含む型の流体動力連結装置に関する。

【０００２】

公知の流体動力連結装置は、軸の回りで対照的に回転し、一方では、駆動側の軸に回転連動するのに適している横断方向の壁を備えるケーシング、および他方では、被駆動側の軸に回転連動するのに適切なハブと一体化されたタービンブレード円板を流体動力的に駆動するために適するブレード円板またはインペラーを備えるハウジングを備えている。

【０００３】

一方では、トランスミッション内への取付けを容易にし、かつ他方では、装置の大きさのためだけではなく、その中に入る流体の量を小とするために、超音波溶接、ポップ（ｐｏｐ）リベット留め、結合またはそれ以外の任意の手段により組み立てられる熱可塑性物質、または熱硬化性プラスチック、合成材料の合金、複合体等の材料の使用によって、重量の削減とともに、流体動力連結装置の軸方向の寸法を削減することが、つねに求められてきた。この重量の削減は、コストの減少につながる。

【０００４】

この軸方向の寸法の削減により、流れの分離、再循環またはキャビテーション現象の開始のための流体の流れにおけるエネルギーを損失させて、性能の低下をさせてはならないことは明らかである。

【０００５】

このような流体動力連結装置は、観光、レジャー、または産業用であるのかにどうかに関係なく、広く自動車に適用することができる。このような用途で公知のように、軸方向の寸法の削減は、かなり追求されている。

【０００６】

軸方向の寸法を小とされた流体動力連結装置は、例えば米国特許第５２４１８

２０号にすでに提案されている。それによると、作動液が利用できる内部回路の輪郭は卵形をしている。この内部回路は、軸に垂直な横断方向面に関して、軸の部分で対称である。

【０００７】

本願の出願人は、装置の性能に影響を及ぼすことなく、この輪郭を非対称な形とすることが可能であることを認識している。

【０００８】

このように本発明によると、流体動力連結装置は、軸の回りで回転的に対称であり、一方では、駆動軸に回転連動するのに適した横断方向壁を備えるケーシング、他方では、被駆動軸に回転連動するのに適したハブと一体化されたタービンブレード円板を流体動力的に駆動するのに適したブレード円板、またはインペラーを備えるハウジングを含み、インペラーおよびタービン円板が、シェルの内面と一体化したブレードを有するシェルから成り立っており、タービンのシェルが凹んだ沈下部によって変形され、かつコアが、形状が沈下部の形状と一致し、直径に関係なく一定した通路断面と適合しつつ、それに沿って伸びている突起部を有することを特徴とする。

【０００９】

この構成により、内部の円周上の空間は、外部周縁の近傍に形成され、例えば、装置の軸方向の容積に影響を及ぼさずに、ロッククラッチを取り付けるための有利に使用することができる。

【００１０】

回路の内部輪郭は、軸部分で、インペラーのシェルの外壁が全体として軸と直角となるようになっていると有利である。

【００１１】

インペラーおよびタービンは、トルクコンバータを構成するために、反応器と結合されていると有利である。

【００１２】

ロッククラッチは、ケーシングの内側に置かれ、タービンとケーシングの間で動作し、前記クラッチは、トーションダンパー、軸に沿って移動自在であるよう

に取り付けられているピストン、および前記ピストンと横断方向壁内面の間で固定されるのに適する少なくとも１つの摩擦ライニングを備え、該トーションダンパーは、２つの部品の間に挟まれる円周上の動作を有するばね、案内ワッシャー、およびウェブを備え、これらの部品の一方を、摩擦ライニングと回転的に一体化し、他方を、タービンと一体化すると有利である。

【００１３】

通常「ロックアップ」と呼ばれるロッククラッチの存在によって、連結装置は、自動車への適用に特に適したものとなる。ハウジングの内側のタービン円板は、ハウジング内で循環する流体によって生じる連結のために、インペラー円板と呼ばれる円板によって駆動され、車両が始動された後に、ロッククラッチは、駆動軸と回転中の被駆動軸を固定することによって、２枚の円板の間でのスリップ現象を妨げるために動作するようになる。

【００１４】

ある好ましい実施形態によると、流体動力連結装置は、本来、タービン円板、ウェブ、案内ワッシャー、および円周上で作用するばねを備え、有利には事前に組み立てられているサブアセンブリを備えている。案内ワッシャーは、ウェブに連結され、円周上の隙間は、ばねの作用の範囲に対応する。

【００１５】

このような構成により、摩擦ライニングを支持する摩擦円板は、ハウジングの内壁とその中で軸に沿って移動自在であるピストンの間に挟まれ、固定の瞬間に、油圧によって作動される。

【００１６】

摩擦円板は、案内ワッシャーに、回転的に連結されている。

【００１７】

変形においては、摩擦円板は、ウェブに回転的に連結されている。

【００１８】

本発明の目的をよりよく理解しうるように、その実施形態を、添付図面に示すが、これは純粋に例示的なものであり、非制限的な例である。

【００１９】

図面は、本発明に従った流体動力連結装置の半分の断面である。

【００２０】

図に表されている流体動力連結装置は、油溜めハウジング１１を形成している耐漏エンクロージャの中に配置されている、トルクコンバータ１２およびロッククラッチ１３を有する。ハウジング１１は、駆動要素を形成し、それは、自動車内燃機関のクランクシャフトに回転連動されるのに適している。

【００２１】

ハウジングは、環状であり、環状の横断方向壁１６を含む第１シェル１５、および第１シェルに面し、インペラー円板２０をブレード２１と画定するようになっている第２シェル１８から成り立っているケーシングを備えている。この円板のブレードは、第２シェル１８の内面１９と一体化されている。シェル１５、１８は、ここでは溶接により連結されている。

【００２２】

変形例においては、それらは、ともに、車両のスターターによって駆動されるようになっているスタータークラウンギヤーを構成する環状部品に溶接されている。そのために、環状部品の外側周縁は歯が切られている。このトルクコンバータ１２は、インペラーのブレード２１に面するブレード２９、および反応器円板３０を備えるタービン円板２８をも備えている。

【００２３】

タービン円板２８は、リベット３３により、歯によって被駆動軸３２に結合されているハブ３５を支持する環状フランジ３４に固定され、被駆動軸３２に回転を伝える。

【００２４】

シェル１８は、図では見えないエンクロージャの中で回転するように取り付けられているスリーブ３８を備えている。

【００２５】

仮枠ハブ４０は、第１シェル１５に中心に溶接され、それは、ロッククラッチ１３を作動するためのピストン４４用の滑り軸受け４１を形成する円筒形の面を有する。後者は、環状横断方向壁１６の内面と前記ピストン４４の平らな表面の

間で、後者が前記環状横断方向壁１６に向かって、油圧の影響を受けて押しやられるときに、留められるのに適した摩擦円板４６を有する。

【００２６】

摩擦円板４６は、以降案内ワッシャー５０と呼ぶ薄板環状部品に回転的に連結されている。円板４６は、その角表面を、壁１６とピストン４４の間で前述されたように留められるのに適した摩擦ライニングで被覆されている金属サポートを有する。さらに、これからウェブ５２と呼ばれる、トーションダンパーの別の環状部品が、タービン円板２８に固定されている。

【００２７】

前記案内ワッシャー５０および前記ウェブ５２は、中空ばね５４の対応する先端部が寄りかかる円周上の当たり面を構成するように作られている。該案内ワッシャー５０は、ウェブ５２に連結され、円周上の隙間により、ばね５４は、トーションダンパーの役割を果たし、トルクピークを吸収することができる。

【００２８】

タービン円板２８は、その内面５６に、ブレード２９が固定されている環状シェル５５を有し、インペラー２０のブレード１９は、シェル１８の内面１９上に固定されている。

【００２９】

作動液が利用できる内部回路は、シェル１８と５５の内面１９と５６の間で画定され、反応器３０の底部３１により、それ自体既知であるように、流体はコア６０によって中央に案内される。ここでは、３つの部品６１，６２，６３の中で、それぞれインペラー２０の、タービン２８のおよび反応器３０のブレード２１，２９および３６の自由な端縁によって支持されていることは言うまでもない。

【００３０】

公知のように、シェルとコア６０の間で画定されている流体の通路の断面が、半径と関係なく、実質的に一定であるようにされていることは、言うまでもない。

【００３１】

構造を逆転することができる。案内ワッシャー５０は、タービン２８のシェル

５５と一体化されているが、摩擦円板４６と一体化されているのは、ウェブ５２であることは言うまでもない。

【００３２】

別の変形によると、案内ワッシャー５０は、ハブ２５のフランジ３４に、リベット３３によって内周縁に固定されているプレートの外周縁に形成され、タービン２８が固定されるのは、このプレートに対してである。

【００３３】

タービン２０を支えているシェル１８の外壁は軸に直角である。さらに、本発明に従って、タービン２８のシェル５５は、クラッチ１３が利用できる空間を増大させるために、一部に凹んだ沈下部５７を設けることによって、クラッチ１３と整列して変形されている。

【００３４】

タービン２８によって支持されているコア６０の部分６２は、コア６０の内側を向く突起部６７を支持し、この突起部６７の形状は、沈下部５７の形状に、その直径に関係なく一致している。

【００３５】

タービン円板２８、案内ワッシャー５０、ウェブ５２および円周上で作用するばね５４を備えるサブアセンブリを事前に組み立てておくと有利である。これを行うために、前記案内ワッシャー５０は、ウェブに結合され、円周上に隙間のあるウェブが、ばね５４の作用に対処することができる。この目的で、それは、前記ウェブを折り畳むことによって得られる円周上の溝の中で係合しうる、放射状の内向きの突起を有する。

【００３６】

動作は、従来の流体動力連結装置の動作と類似している。注意として、タービン円板２８が、エンクロージャに入れられている流体のために、インペラーの円板によって駆動されること、および車両が始動された後に、ロッククラッチ３５が、円板２０と２８の間の滑り現象を回避する目的で、摩擦円板４６の締め付けによって、ピストン４４の軸方向の移動の影響により、被駆動軸を駆動軸で固定することができる。

【００３７】

その結果生じる固定により、被駆動軸３２、典型的には、ギヤボックスの入力軸の直接的な駆動が、車両のエンジンのクランクシャフトと回転的に連動するハウジング１１によって可能となる。

【図面の簡単な説明】

【図１】

本発明の実施形態を示す半断面図である。

【符号の説明】

１１　ハウジング

１２　トルクコンバータ

１３　ロッククラッチ

１５、１８、５５　シェル

１６　横断方向壁

１９　内面

２０　インペラー

２１、２９、３６　ブレード

２８　タービン

３０　反応器

３１　底部

３２　被駆動軸

３３　リベット

３４　フランジ

３５　ロッククラッチ

３８　スリーブ

４０　仮枠ハブ

４１　滑り軸受け

４４　ピストン

４６　摩擦円板

５０　案内ワッシャー

５２　ウェブ

５４　ばね

５６　内面

５７　沈下部

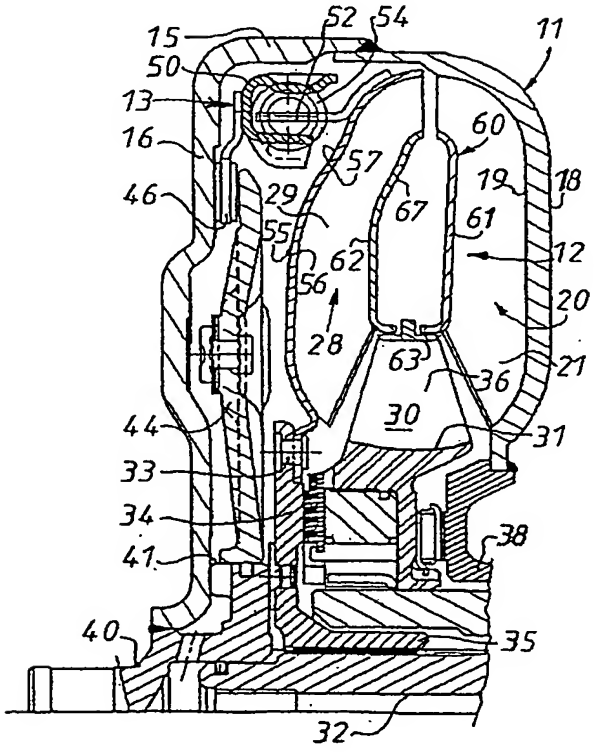
６０　コア

６１、６２、６３　部品

６７　突起部

【図１】

FIGURE UNIQUE



PATENT ABSTRACTS OF JAPAN

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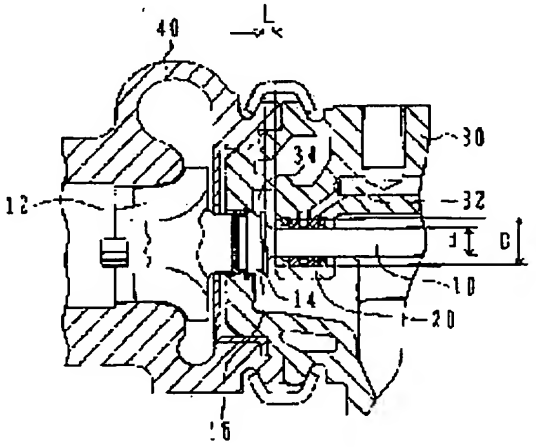
(54) EXHAUST TURBINE TYPE SUPERCHARGER FOR INTERNAL COMBUSTION ENGINE AND SUPERCHARGING SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an exhaust turbine type supercharger for an internal combustion engine capable of reducing oil leakage.
SOLUTION: A turbine impeller 12 rotationally driven by exhaust gas of an internal combustion engine is fixed at a turbine shaft 10. The turbine shaft 10 is supported in a radial direction by a radial bearing 20 and mounted on a bearing housing 30. The turbine shaft 10 is formed between the turbine impeller 12 and the radial bearing part 20, and a stepped part 14 is provided such that the turbine side is further increased in an outside diameter than the radial bearing part side. The bearing housing 30 has an oil drain 34 to drain oil lubricating the radial bearing part 20. A distance L from the side wall surface of the radial bearing to the stepped part is set to a distance, at which oil moved from the end part of a radial bearing is brought into a state to be non-contact with the stepped part, at a region where the number Nt of revolutions of a turbine is higher than the number Nti of revolutions of a turbine during idle operation of an engine.



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CLAIMS

[Claim(s)]

[Claim 1] The turbine shaft fixed to the turbine impeller by which a rotation drive is carried out with an internal combustion engine's exhaust gas, It has the radial bearing attached in bearing housing while supporting this turbine shaft to the radial direction. The above-mentioned turbine shaft It has the section with a stage in which it was formed between the above-mentioned turbine impeller and the above-mentioned radial bearing section, and the turbine impeller side was formed so that an outer diameter might become large from a radial bearing section side. In the exhaust gas turbine type supercharger for internal combustion engines which has an oil drain for the above-mentioned bearing housing to carry out the drain oil of the oil which carried out the lubrication of the above-mentioned radial bearing section The distance L from the side-attachment-wall side of the above-mentioned radial bearing to the above-mentioned section with a stage in the field where the turbine engine speed Nt is larger than the turbine engine speed Nti at the time of idle operation of an engine The exhaust gas turbine type supercharger for internal combustion engines with which the oil which moved from the edge of the above-mentioned radial bearing is characterized by considering as the distance which serves as non-contact at the above-mentioned section with a stage.

[Claim 2] The turbine shaft fixed to the turbine impeller by which a rotation drive is carried out with an internal combustion engine's exhaust gas, It has the radial bearing attached in bearing housing while supporting this turbine shaft to the radial direction. The above-mentioned turbine shaft It has the section with a stage in which it was formed between the above-mentioned turbine impeller and the above-mentioned radial bearing section, and the turbine impeller side was formed so that an outer diameter might become large from a radial bearing section side. In the exhaust gas turbine type supercharger for internal combustion engines which has an oil drain for the above-mentioned bearing housing to carry out the drain oil of the oil which carried out the lubrication of the above-mentioned radial bearing section the above-mentioned oil drain Open wide from the supporter of the above-mentioned radial bearing to the above-mentioned turbine impeller side, and it is formed so that the section with a stage of the above-mentioned turbine shaft may be included. The exhaust gas turbine type supercharger for internal combustion engines characterized by the distance L from the open aspect from the above-mentioned radial bearing section to the section with a stage of the above-mentioned turbine shaft making it larger than the single-sided clearance between the insertion hole bore D of the above-mentioned radial bearing, and the outer diameter d of the above-mentioned turbine shaft.

[Claim 3] The exhaust gas turbine type supercharger for internal combustion engines characterized by having the ring-like plate inserted in either claim 1 or claim 2 on the above-mentioned turbine shaft outside in the exhaust gas turbine type supercharger for internal combustion engines of a publication between the open aspect of the above-mentioned radial bearing section, and the above-mentioned radial bearing.

[Claim 4] The supercharger system characterized by having the control means to which idle rpm is made to increase after continuing beyond the setup time with idle operational status in the supercharge system using the exhaust gas turbine type supercharger for internal combustion engines which has the radial bearing attached in bearing housing, while supporting the turbine shaft fixed to the turbine impeller by which a rotation drive is carried out with an internal combustion engine's exhaust gas, and this turbine shaft to a radial direction.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the exhaust gas turbine type supercharger for internal combustion engines, and a supercharge system.
[0002]
[Description of the Prior Art] In the conventional exhaust gas turbine for internal combustion engines, while carrying out rotation support of the turbine shaft by radial bearing, the lubrication of the radial bearing is carried out by oil. There are problems, like if lubrication oil is revealed into an exhaust pipe from a turbine impeller side, it will produce white smoke. Then, what prevents the oil leakage by the side of a turbine impeller is known for the conventional exhaust gas turbine for internal combustion engines by preparing the section with a stage in a turbine shaft, and making it disperse in a radial bearing side using the slot formed in this section with a stage, for example as indicated by JP,48-72511,A.
[0003]
[Problem(s) to be Solved by the Invention] However, the dispersed lubrication oil may trespass upon the outside surface of a turbine shaft, and the clearance between bearing housing by the method indicated by JP,48-72511,A. Although the seal ring was prepared between a turbine shaft and bearing housing, the pressure Pt by the side of the turbine impeller of a seal ring had the problem that differential pressure deltaP (Pt-Ph) of a seal ring becomes the pulsation to which positive pressure and negative pressure are repeated since the pressure Ph by the side of an oil drain is atmospheric pressure mostly, and oil was revealed to a turbine impeller side for the negative pressure of differential pressure deltaP, to there being exhaust air pulsation.
[0004] According to the place which this invention persons checked, it became clear that oil tends to trespass upon the outside surface of a turbine shaft and the clearance between bearing housing, so that the engine speed of a turbine was low. Since it tends to reduce idle rpm and a turbine rotational frequency also falls inevitably for the improvement in fuel consumption, it is easy to reveal oil and the latest automobile is becoming.
[0005] The purpose of this invention is to offer the exhaust gas turbine type supercharger for internal combustion engines which can reduce oil leakage.
[0006]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, (1) This invention The turbine shaft fixed to the turbine impeller by which a rotation drive is carried out with an internal combustion engine's exhaust gas, It has the radial bearing attached in bearing housing while supporting this turbine shaft to the radial direction. The above-mentioned turbine shaft It has the section with a stage in which it was formed between the above-mentioned turbine impeller and the above-mentioned radial bearing section, and the turbine impeller side was formed so that an outer diameter might become large from a radial bearing section side. In the exhaust gas turbine type supercharger for internal combustion engines which has an oil drain for the above-mentioned bearing housing to carry out the drain oil of the oil which carried out the lubrication of the above-mentioned radial bearing section It is the field where the turbine engine speed Nt is larger than the turbine

engine speed Nti at the time of idle operation of an engine, and the oil which moved from the edge of the above-mentioned radial bearing makes distance L from the side-attachment-wall side of the above-mentioned radial bearing to the above-mentioned section with a stage the distance which serves as non-contact at the above-mentioned section with a stage. By this configuration, scattering of oil is reduced and oil leakage can be reduced.

[0007] In order to attain the above-mentioned purpose, (2) Moreover, this invention The turbine shaft fixed to the turbine impeller by which a rotation drive is carried out with an internal combustion engine's exhaust gas, It has the radial bearing attached in bearing housing while supporting this turbine shaft to the radial direction. The above-mentioned turbine shaft It has the section with a stage in which it was formed between the above-mentioned turbine impeller and the above-mentioned radial bearing section, and the turbine impeller side was formed so that an outer diameter might become large from a radial bearing section side. In the exhaust gas turbine type supercharger for internal combustion engines which has an oil drain for the above-mentioned bearing housing to carry out the drain oil of the oil which carried out the lubrication of the above-mentioned radial bearing section the above-mentioned oil drain Open wide from the supporter of the above-mentioned radial bearing to the above-mentioned turbine impeller side, and it is formed so that the section with a stage of the above-mentioned turbine shaft may be included. The distance L from the open aspect from the above-mentioned radial bearing section to the section with a stage of the above-mentioned turbine shaft makes it larger than the single-sided clearance between the insertion hole bore D of the above-mentioned radial bearing, and the outer diameter d of the above-mentioned turbine shaft. By this configuration, scattering of oil is reduced and oil leakage can be reduced.

[0008] (3) In the above (1) or (2), it has the ring-like plate inserted in the above-mentioned turbine shaft outside between the open aspect of the above-mentioned radial bearing section, and the above-mentioned radial bearing. By this configuration, further, scattering of oil is reduced and oil leakage can be reduced.

[0009] (4) Moreover, after continuing beyond the setup time with idle operational status in the supercharge system using the exhaust gas turbine type supercharger for internal combustion engines which has the radial bearing attached in bearing housing while this invention supports the turbine shaft fixed to the turbine impeller by which a rotation drive is carried out with an internal combustion engine exhaust gas, and this turbine shaft to a radial direction in order to attain the above-mentioned purpose, it has the control means to which idle rpm is made to increase. By this configuration, scattering of oil is reduced and oil leakage can be reduced.

[0010]

[Embodiment of the Invention] Hereafter, the configuration of the exhaust gas turbine type supercharger for internal combustion engines by the 1st operation gestalt of this invention is explained using drawing 1 - drawing 3 . First, drawing 1 and drawing 2 are used and the configuration of the exhaust gas turbine type supercharger for internal combustion engines by this operation gestalt is explained. Drawing 1 is the fragmentary sectional view showing the configuration of the exhaust gas turbine type supercharger for internal combustion engines by the 1st operation gestalt of this invention, and drawing 2 is the important section expanded sectional view of drawing 1 . In addition, in drawing 1 and drawing 2 , the same sign shows the same part.

[0011] As shown in drawing 1 , the turbine impeller 12 is formed in the end of the turbine shaft 10. Moreover, although illustration is omitted, the compressor impeller is prepared in the other end of the turbine shaft 10. The turbine shaft 10 is supported by radial bearing 20 pivotable to the bearing housing 30. The turbine impeller 12 is contained in the turbine housing 40. The turbine housing 40 is being fixed to the bearing housing 30.

[0012] The oil supply path 32 is formed in the interior of the bearing housing 30. Lubrication oil is supplied to radial bearing 20 through the oil supply path 32 from the exterior. It is the inner circumference side of the bearing housing 30, and the oil drain room 34 is formed in the turbine impeller 12 side of radial bearing 20. The oil which carried out the lubrication of the radial bearing 20 is collected outside by the oil drain room 34. Again, the collected oil is supplied from the oil supply path 32, and is used for the lubrication of radial bearing 20.

[0013] The [illegible]

[0013] The section 14 with a stage is formed in the turbine impeller 12 side of the turbine shaft 10. Furthermore, the slot 16 is formed between the section 14 with a stage, and the turbine impeller 12.
[0014] Here, the surrounding detail structure of the radial bearing section 20 is explained using drawing 2 . Radial bearing 20 is a ring-like. Two or more through hole 20A is prepared in the mid gear of the shaft orientations of radial bearing 20 at the circumferencial direction. The oil supplied from the oil supply path 32 lets through hole 20A pass, is supplied to radial bearing 20, and carries out the lubrication of the radial bearing 20. The snap rings 22 and 24 of C form configuration are inserted in the both ends of radial bearing 20. The periphery section of snap rings 22 and 24 is engaging with the slot formed in the inner circumference side of the bearing housing 30, prevents the path directional movement of radial bearing 20, and holds radial bearing 20 in the bearing housing 30.
[0015] It is the turbine impeller 12 side of the turbine shaft 10, and slot 10A is formed in edge 30A of the bearing housing 30, and the part which counters. The seal ring 26 is inserted in this slot 10A, and the seal of oil leaking from the oil drain room 34 side to the turbine impeller 12 side is carried out to it.
[0016] It is the turbine impeller 12 side of the turbine shaft 10, and the section 14 with a stage is formed in the part located in the oil drain room 34. Furthermore, the slot 16 is formed between the section 14 with a stage, and the turbine impeller 12.
[0017] The oil which carried out the lubrication of the radial bearing 20 moves in the direction of the turbine impeller 12 along with the turbine shaft 10. If the turbine shaft 10 rotates, after the oil which moved to the section 14 with a stage disperses in radial and adheres to the internal surface of the oil drain room 34, it will be collected from the lower part of the oil drain room 34. After the oil which fell to the slot 16 after adhering to the internal surface of the oil drain room 34 uses the configuration of a slot 16, disperses on the radial outside according to a centrifugal force further and adheres to the internal surface of the oil drain room 34, it is collected from the lower part of the oil drain room 34. However, when oil adheres to near internal-surface 34A of the turbine impeller 12 of the oil drain room 34, it will trespass upon the clearance between the turbine shaft 10 and the bearing housing 30. Differential pressure deltaP (Pt-Ph) of the near pressure Pt of the turbine impeller 12 of a seal ring 26 and the near pressure Ph of the oil drain room 34 becomes the pulsation which repeats positive pressure and negative pressure, and for the negative pressure of differential pressure deltaP, if oil is revealed to a turbine impeller side, it will become things.
[0018] this invention persons paid their attention about the distance L from edge 30B of the bearing housing 30 by the side of the open section of radial bearing 20 to the section 14 with a stage of the turbine shaft 10, and examined the scattering situation of oil. The result is explained using drawing 3 .
[0019] Here, the scattering situation of the oil in the exhaust gas turbine type supercharger for internal combustion engines by this operation gestalt is explained using drawing 3 . Drawing 3 is the explanatory view of the scattering situation of the oil in the exhaust gas turbine type supercharger for internal combustion engines by the 1st operation gestalt of this invention.
[0020] In drawing 3 , the axis of abscissa shows distance [from edge 30B of the bearing housing 30 by the side of the open section of radial bearing 20 to the section 14 with a stage of the turbine shaft 10] L (mm), and the axis of ordinate shows the turbine rotational frequency Nt (rpm).
[0021] In the conventional supercharger, distance L was 1.0mm. Therefore, it became clear that oil dispersed [the turbine rotational frequency Nt] in the field of 4200 or less rpm. It became clear that the turbine rotational frequency Nt in which oil does not disperse fell as distance L was enlarged to it. Moreover, it became clear that oil did not disperse, so that the turbine rotational frequency was high.
[0022] When the behavior of oil is examined based on the scattering situation of above-mentioned oil, the oil which leaked and came out of edge 30B of the bearing housing 30 by the side of the open section of radial bearing 20 moves to the direction of the section 14 with a stage along with the turbine shaft 10. When the turbine engine speed Nt is high, the oil which carried out the lubrication of the radial bearing 20 is discharged in the wall surface of a radial bearing supporter by the centrifugal force and gravity by rotation of the turbine shaft 10 at propagation and the oil drain room 34. If the turbine engine speed Nt is reduced, the effect of the centrifugal force by rotation of the

34. If the turbine engine speed Nt is reduced, the effect of the centrifugal force by rotation of the turbine shaft 1 to oil will become small, and oil will push out to the section 12 side with a stage of the turbine shaft 10. Furthermore, if the turbine engine speed Nt is reduced, oil will reach the section 2 with a stage of the turbine shaft 10, and oil will carry out scattering initiation into the oil drain room 34 according to the centrifugal force by rotation of the turbine shaft 10 on the radial outside. Since the migration length of oil became long and oil stopped being able to reach the section 12 with a stage easily so that distance L is long, it became clear that it was hard that it comes to disperse even if it reduces the turbine rotational frequency Nt.

[0023] The amount of oil which leaks and comes out will be proportional to the single-sided clearance (D-d) between the insertion hole bore D of radial bearing 20, and the outer diameter d of the turbine shaft 10 (/2). Then, the amount of scattering of oil can be reduced by carrying out distance L from edge 30B of the bearing housing 30 by the side of the open section of radial bearing 20 to the section 14 with a stage of the turbine shaft 10 to more than the single-sided clearance (D-d) between the insertion hole bore D of radial bearing 20, and the outer diameter d of the turbine shaft 10 (/2). For example, in the example shown in drawing 3 , since the insertion hole bore D of radial bearing 20 was 6mm, as for a single-sided clearance (D-d) (/2), the outer diameter d of those with 10mm and the turbine shaft 10 is set to 2mm by it. By setting distance L to 2.0mm, the turbine rotational frequency Nt in which oil disperses can be fallen to 3000rpm.

[0024] Here, since the turbine rotational frequency Nti at the time of idle rotation of an engine was 2500rpm, in order to make it not disperse oil above this rotational frequency Nti, they are 2.6mm or more (1.3 or more times of a single-sided clearance (D-d) (/2)), then a good thing about distance L.

[0025] Moreover, since 2.8mm (1.4 or more times of a single-sided clearance (D-d) (/2)), then the turbine rotational frequency Nti in which oil disperses can reduce distance L to 2000rpm, oil scattering will be generated.

[0026] Since the oil adhesion to near internal-surface 34A of the turbine impeller 12 of the oil drain room 34 can be reduced by the ability reducing oil scattering, oil invasion in the clearance between the turbine shaft 10 and the bearing housing 30 can be reduced, and oil leakage can be reduced to a turbine impeller side.

[0027] Moreover, by considering as the distance L which oil scattering does not produce, oil invasion in the clearance between the turbine shaft 10 and the bearing housing 30 can be prevented, and oil leakage can be prevented to a turbine impeller side. Here, the oil which leaked and came out of edge 30B of the bearing housing 30 by the side of the open section of radial bearing 20 more than the number Nti of turbine rotations at the time of idle rotation of an engine moves in the turbine shaft 10 top, and the distance L which oil scattering does not produce is a distance non-contact in the section 14 with a stage.

[0028] As explained above, according to this operation gestalt, scattering of oil drain indoor oil can be reduced, therefore the oil leakage by the side of a turbine impeller can be reduced.

[0029] Next, the configuration of the exhaust gas turbine type supercharger for internal combustion engines by the 2nd operation gestalt of this invention is explained using drawing 4 - drawing 6 . First, drawing 4 and drawing 5 are used and the configuration of the exhaust gas turbine type supercharger for internal combustion engines by this operation gestalt is explained. Drawing 4 is the fragmentary sectional view showing the configuration of the exhaust gas turbine type supercharger for internal combustion engines by the 2nd operation gestalt of this invention, and drawing 5 is the important section expanded sectional view of drawing 4 . In addition, the same sign as drawing 1 and drawing 2 shows the same part.

[0030] The fundamental configuration of the exhaust gas turbine type supercharger for internal combustion engines by 1 operation gestalt of this invention is the same as that of what was shown in drawing 1 . The part which is different from drawing 1 is the surrounding structure of the radial bearing section 20, and while snap rings 22A and 24 are inserted in the both sides of radial bearing 20, between snap-ring 22A and the radial bearing section 20, the ring 28 is inserted further.

[0031] Here, the surrounding detail structure of the radial bearing section 20 is explained using drawing 5 . Radial bearing 20 is a ring-like. Two or more through hole 20A is prepared in the mid gear of the shaft orientations of radial bearing 20 at the circumferencial direction. The oil supplied

from the oil supply path 32 lets through hole 20A pass, is supplied to radial bearing 20, and carries out the lubrication of the radial bearing 20. The snap ring 24 of C form configuration is inserted in one edge (edge by the side of drawing Nakamigi) of radial bearing 20. Moreover, snap-ring 22A of C form configuration is inserted in the other-end section (edge of the left-hand side in drawing) of radial bearing 20 through the plate 28. A plate 28 is a ring-like. The periphery section of snap rings 22A and 24 is engaging with the slot formed in the inner circumference side of the bearing housing 30, prevents the path directional movement of radial bearing 20, and holds radial bearing 20 in the bearing housing 30.

[0032] Here, if the outer diameter of the radial bearing section 20 is set to R1, the outer diameter R2 of a plate 28 is set to R2>R1. Moreover, it is referred to as R3>R2 if the outer diameter of snap-ring 22A is set to R3. Since snap-ring 22A is carrying out C typeface configuration as mentioned above, it has notching in the periphery section. Therefore, in a configuration as shown in drawing 2 , the lubrication oil which moved in the direction of the turbine impeller 12 will leak and come out from the notching section of snap-ring 22A shown in drawing 2 in the direction of the turbine impeller 12 from the clearance by the side of the periphery of the radial bearing section 20, and the inner circumference of the bearing housing 30. With this operation gestalt, it is considering as > (outer diameter R2 of a plate 28) (outer diameter R1 of the radial bearing section 20) to it, and since a plate 28 is a ring-like, the lubrication oil which moved in the direction of the turbine impeller 12 from the clearance by the side of the periphery of the radial bearing section 20 and the inner circumference of the bearing housing 30 is prevented with a plate 28, and has composition which is hard to leak in the direction of the turbine impeller 12.

[0033] Here, the scattering situation of the oil in the exhaust gas turbine type supercharger for internal combustion engines by this operation gestalt is explained using drawing 6 . Drawing 6 is the explanatory view of the scattering situation of the oil in the exhaust gas turbine type supercharger for internal combustion engines by the 2nd operation gestalt of this invention.

[0034] In drawing 3 , the axis of abscissa shows the distance L1 from edge 30B of the bearing housing 30 by the side of the open section of radial bearing 20 to the section 14 with a stage of the turbine shaft 10 (mm), and the axis of ordinate shows the turbine rotational frequency Nt (rpm).

[0035] moreover, the field where the oil in which the broken line was shown in drawing 3 disperses -- being shown -- **** . To it, a continuous line shows and the field where an oil when the field which performed hatching uses the plate 28 by this operation gestalt disperses is shown. That is, the field where an oil disperses can be narrowed by using a plate 28 so that clearly from the condition of illustration.

[0036] Here, since the turbine rotational frequency Nti at the time of idle rotation of an engine was 2500rpm, in order to make it not disperse oil above this rotational frequency Nti, they are 2.25mm or more (1.125 or more times of a single-sided clearance (D-d) (/2)), then a good thing about distance L1.

[0037] Moreover, since 2.5mm (1.25 or more times of a single-sided clearance (D-d) (/2)), then the turbine rotational frequency Nti in which oil disperses can reduce distance L1 to 2300rpm, oil scattering will be generated. In the case of L1=2.5mm, it is turbine rotational frequency Nto=2800rpm at the time of oil scattering initiation in case there is no plate, and Nto falls to 2300rpm by putting in a plate, it becomes less than [turbine rotational frequency Nti=2500rpm] at the time of idle operation, and oil scattering can be prevented.

[0038] Since the oil adhesion to near internal-surface 34A of the turbine impeller 12 of the oil drain room 34 can be reduced by the ability reducing oil scattering, oil invasion in the clearance between the turbine shaft 10 and the bearing housing 30 can be reduced, and oil leakage can be reduced to a turbine impeller side.

[0039] Moreover, by considering as the distance L1 which oil scattering does not produce, oil invasion in the clearance between the turbine shaft 10 and the bearing housing 30 can be prevented, and oil leakage can be prevented to a turbine impeller side. Here, the oil which leaked and came out of edge 30B of the bearing housing 30 by the side of the open section of radial bearing 20 more than the number Nti of turbine rotations at the time of idle rotation of an engine moves in the turbine shaft

10 top, and the distance L which oil scattering does not produce is a distance non-contact in the section 14 with a stage.

[0040] As explained above, according to this operation gestalt, scattering of oil drain indoor oil can be reduced, therefore the oil leakage by the side of a turbine impeller can be reduced. Moreover, oil leakage can be further reduced by using a plate.

[0041] Next, the engine structure of a system and actuation equipped with the exhaust gas turbine type supercharger for internal combustion engines by the 3rd operation gestalt of this invention are explained using drawing 7 and drawing 8 . First, drawing 7 is used and the engine system whole configuration equipped with the exhaust gas turbine type supercharger for internal combustion engines by this operation gestalt is explained. Drawing 7 is the supercharge system whole block diagram equipped with the exhaust gas turbine type supercharger for internal combustion engines by 1 operation gestalt of this invention.

[0042] The airstream inhaled by the engine 101 is taken in from an air cleaner 102, is supercharged by the turbine impeller 12 of the supercharger 120 formed in the inlet pipe 103, passes along a throttle valve 104, and goes into a collector 105. The air inhaled by the collector 105 is distributed to each inlet pipe 107 connected into each cylinder 106 of an engine 101, and is drawn in the combustion chamber 108 of a cylinder 106. After the combustion exhaust gas from a combustion chamber 108 rotates the compressor impeller 121 of a supercharger 120 through an exhaust pipe 109, it is emitted to the open air. It is arranged at the connection to the combustion chamber 108 of an inlet pipe 107 and an exhaust pipe 109 so that an inlet valve 110 and an exhaust valve 111 may carry out a switching action by the cam mechanism. Moreover, a throttle sensor is arranged at a throttle valve 104, and the pressure sensor 113 is arranged further at the down-stream inlet pipe 107. On the other hand, fuels, such as a gasoline, are injected in an inlet pipe 107 from an injector 116. The cylinder 106 is equipped with the coolant temperature sensor 131.

[0043] The output signal of each sensor is inputted into the engine control unit (ECU) 100, and the engine water temperature which is the parameter which shows the operational status of an engine 101, a crank angle rate, rotational speed, the pressure of inhalation of air, the amount of accelerator pedal treading in, and the opening of a throttle valve 104 measure or calculate it. Based on whenever [parameter or amount of accelerator pedal treading in, or throttle valve-opening], the engine control unit 100 calculates controlled variables, such as ignition timing, and fuel injection timing, an amount, operates an ignition plug 132, an injector 117, and the various actuators of throttle-valve 104 grade, and is performing engine operation control and a throttle valve control. [which show the operational status of the calculated engine]

[0044] Here, the configuration of a supercharger 120 has composition shown in drawing 1 or drawing 4 . Furthermore, a collector 105 is connected with an inlet pipe 103, and the idle rise bulb 140 is formed in the passage which bypasses a throttle valve 104. Closing motion control of the idle rise bulb 140 is carried out by the engine control unit 100. When the idle rise bulb 140 opens, an inhalation air content increases and an engine speed can be raised.

[0045] Next, the control approach in the engine system equipped with the exhaust gas turbine type supercharger for internal combustion engines by this operation gestalt is explained using drawing 8 . Drawing 8 is the explanatory view of the control approach in the supercharge system equipped with the exhaust gas turbine type supercharger for internal combustion engines by the 3rd operation gestalt of this invention.

[0046] In drawing 8 (A), an axis of ordinate shows an engine speed and the axis of ordinate shows the turbine rotational frequency in drawing 8 (B). Moreover, in drawing 8 (A) and (B), the axis of abscissa shows time amount.

[0047] In drawing 8 , time of day t1-t3 is the field of idle operation. The engine control unit 100 will be controlled to open the idle rise bulb 140, to increase an engine speed, and to increase a turbine rotational frequency, if it judges whether it is in idle operation and the condition of idle operation continues time amount T1. That is, after continuing between the setup times T1 with idle operational status, he is trying to make idle rpm increase in this operation gestalt.

[0048] For example, as a supercharger is equipped with the configuration 28 shown in drawing 4 ,

i.e., a plate, and it was shown in drawing 6 in the case of L1=2.0mm, the turbine rotational frequency Nto at the time of oil scattering initiation is 2800rpm. Here, by making idle rpm increase to 950rpm, if idle operation will continue one or more [time amount T] supposing the turbine rotational frequency Nt in case the idle rpm of the engine with which the turbine type supercharger of this operation gestalt is installed is 800rpm is 2500rpm, since the turbine rotational frequency Nt increases to 4000rpm, it can prevent oil scattering, for example.

[0049] Although considered as the supercharger equipped with the plate 28 in the above explanation, as shown in drawing 1 , even when there is no plate, as shown in drawing 3 , oil scattering can be prevented by making idle rpm increase to 950rpm, and making a turbine rotational frequency increase to 4000rpm. The turbine engine speed Nti at the time of engine idle operation is increased without the structural change of a supercharger from the turbine engine speed Nto at the time of oil scattering initiation as mentioned above, and oil scattering can be prevented.

[0050] With this operation gestalt, oil scattering can be reduced by engine control as mentioned above.

[0051]

[Effect of the Invention] According to this invention, the oil leakage in the exhaust gas turbine type supercharger for internal combustion engines can be reduced.

[0052]

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the fragmentary sectional view showing the configuration of the exhaust gas turbine type supercharger for internal combustion engines by the 1st operation gestalt of this invention.
[Drawing 2] It is the important section expanded sectional view of drawing 1 .
[Drawing 3] It is the explanatory view of the scattering situation of the oil in the exhaust gas turbine type supercharger for internal combustion engines by the 1st operation gestalt of this invention.
[Drawing 4] It is the fragmentary sectional view showing the configuration of the exhaust gas turbine type supercharger for internal combustion engines by the 2nd operation gestalt of this invention.
[Drawing 5] It is the important section expanded sectional view of drawing 4 .
[Drawing 6] It is the explanatory view of the scattering situation of the oil in the exhaust gas turbine type supercharger for internal combustion engines by the 1st operation gestalt of this invention.
[Drawing 7] It is the supercharge system whole block diagram equipped with the exhaust gas turbine type supercharger for internal combustion engines by 1 operation gestalt of this invention.
[Drawing 8] It is the explanatory view of the control approach in the supercharge system equipped with the exhaust gas turbine type supercharger for internal combustion engines by the 3rd operation gestalt of this invention.
[Description of Notations]
10 -- Turbine shaft
14 -- The section with a stage
12 -- Turbine impeller
16 -- Slot
20 -- Radial bearing
22 24 -- Snap ring
26 -- Seal ring
29 -- Ring
30 -- Bearing housing
34 -- Oil drain

[Translation done.]